THE ANTHEMIDEAE AND SENECIONEAE (ASTERACEAE) WARE OF LOUISIANA

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INTRODUCTION

The early botanical work on the vascular plants of Louisiana was carried on by several botanists including R. S. Cocks, S. L. P. De Cubieres, W. R. Dodson, C. Dorman, A. Featherman, and T. Vaughn (Brown 1945). Rafinesque's Florula Ludoviciana was published in 1817. His publication is significant not only as the first localized record of plants of southern Louisiana but also for including numerous new names, many of which have been accepted as valid names or have become the basionyms of new name combinations. The majority of the vascular flora of Louisiana is directly or indirectly covered by the floristic works of several botanists such as Chapman (1889), Mohr (1901), Small (1903, 1933), Fernald (1950), Gleason and Cronquist (1963), Radford et al. (1968), and Correll and Johnston (1970).

With reference to the recent botanical works in Louisiana, the following taxa have been assessed: ferns and fern allies (Brown and Correll 1942, Thieret 1980), Alismataceae (Curry and Allen 1973), Fabaceae (Lasseigne 1973), Rhyncosporeae and Sclerieae (Joyce 1974), Orchidaceae (Pridgeion and Urbatsch 1977), Onagraceae (Ellis and Urbatsch 1979), Droseraceae and Sarraceniaceae (Murray and Urbatsch 1979), Poaceae (Allen 1980), and Scrophulariaceae (Vincent 1982). Thomas and Allen (1982, 1984) published preliminary checklists on the vascular plants of Louisiana.

The family Asteraceae is one of the least studied families of the flowering plants for Louisiana. Several taxa of the Asteraceae of Louisiana, such as the genus Elephantopus (Curry 1976) and the tribe Veronieae, including the genera Elephantopus, Stokesia, and Veronia (Urbatsch 1977), have been reviewed. However, to date, a comprehensive floristic treatment has not been performed on the entire Asteraceae of Louisiana. As a part of the project on the flora of Louisiana, Gandhi and Thomas (1984a, 1984b, 1984c) studied the family Asteraceae as well as Convolvulaceae, Cuscutaceae, and Lamiaceae.

The family Asteraceae (also known as the Compositae) is cosmopolitan in distribution and is one of the most successful families of the flowering plants, consisting of as many as 13,000 species belonging to 900 genera (Willis 1973). In the United States, the family is represented by approximately 2,550 species belonging to 340 genera (Rice et al. 1982). The family is classified into 13 tribes belonging to two subfamilies (Cronquist 1981). The subfamily Asteroideae consists of the following 12 tribes: the Anthemideae, Arctotideae, Astereae, Calenduleae, Cynareae, Eupatorieae, Heliantheae, Inuleae, Liabeae, Mutisieae, Senecioneae, and Vernonieae. The subfamily Cichorioideae (= Lactucoideae) consists of only one tribe, the Cichorieae (= Lactuceae).

In Louisiana, the family Asteraceae is one of the dominant herbaceous families in the flora. It is also the largest family, represented by more than 360 species belonging to 90 genera. These taxa belong to 10 tribes, i.e., nine tribes in Asteroideae (excluding the Arctotideae, Calenduleae, and Liabeae) and the only tribe in the Cichorioideae. Some of these taxa are cultivated for ornamental or commercial purposes, e.g., Ageratum, Ambrosia, Anthemis, Aster, Bidens, Chrysanthemum, Cichorium, Coreopsis, Dahlia, Gerbera, Helianthus, Lactuca, Rudbeckia, Santolina, Senecio, Solidago, Tagetes, Tanacetum, Taraxacum, and many others.

For the purpose of a Master of Science thesis, the tribes Anthemideae and Senecioneae have been studied in detail by the senior author. The objective of this study was to produce a thesis that includes descriptions, keys, nomenclature, and data on the distribution, habitats, and phenology. The tribes Anthemideae and Senecioneae are represented in Louisiana by at least 27 species belonging to genera. The Botanical contributions made on the Asteraceae by Baillon (1888), Bailey (1949), Lawrence (1951), Cronquist (1952, 1955, 1980, 1981), and Rendle (1967) and on a few of its members by Cabrera (1949), Turner (1956), Kral and Godfrey (1958) and Barkley (1978) have been quite helpful in better understanding the family in general and the two tribes in particular.

MATERIALS AND METHODS

Sources of Specimens

The herbarium specimens on deposit in the Herbarium Northeast Louisiana University (NLU) provided the data for this study. The majority of the specimens were collected by Dr. R. Dale Thomas from Louisiana and other states during the past 17 years. Representative specimans of these tribes on deposit in the following Louisiana herbaria were also studied: Louisiana State University, Baton Rouge (LSU); Louisiana State University, Shreveport (LSUS); Northwestern State University (NATC); Tulane University (NO); and University of Southwestern Louisiana (LAF). (The acronyms of the herbaria are as given in Holmgren et al. 1981.)

For floristic study, either fresh or preserved (pickled) materials are preferred to dry ones. With the exception of a few species, this author did not have the access to fresh specimens. Dried flowering materials were removed from the herbarium specimens and soaked in 100° C water. The soft textured specimens were soaked for 2 to 5 minutes and hard textured specimens soaked for 5 to 15 minutes. This soaking causes the material to regain the original turgidity. Such a condition simulates that of the fresh specimen. At the conculsion of the study, the flowering material was re-dried, enclosed in a paper package, and was returned to the respective herbarium sheet.

Format

The sequence of the description of the taxa is as follows:

1. Family name, authority, common name and description
2. Key to the tribes Anthemideae and Senecioneae
3. Key to the genera
4. Generic number, name, authority, common name, description, total number of species and their distribution found in the world, and total number of species found in the Unites States
5. Key to the species
6. Species number, name, authority, publication details, common name, basionym, synonym, and description.
7. Infraspecific taxa number, name authority, publication details, common name, basionym, synonym, and description

The sequence of the arrangement of the tribes, genera, and species follows Cronquist (1980). The information on the names of taxa, authorities, and publication details is based on the data obtained from the Index Kewensis Plantarum Phanerogamarum (1893-), Index to American Botanical Literature (1886-), Gray Herbarium Card Index (1886-), and National List of Scientific Plant Names (Rice et al. 1982). In the event of discrepancies between the Index Kewensis Plantarum Phanerogamarum and other sources, the discrepancy was indicated in a note under the description of the respective species.

The common names used locally are mentioned. For all such names of taxa involving new combinations, basionyms are provided. The citation of synonyms is restricted to taxa, the correct names of which differ from those used in recent manuals of the eastern United States and Texas.

The descriptions of the taxa such as the family, genus, and species are based mostly on the specimens from Louisiana but also include selected information from specimens which are on deposit in Northeast Louisiana University Herbarium from other states. The descriptions include features on the nature of the habit, stem, leaves, inflorescence, flowers, and fruits; the measurements, numbers, shapes, colors, and any other special features of most of the above mentioned parts are provided. Each description begins with either a noun or an adjective and ends with a noun, adjective, or participle. If any part of the description is specific to Louisiana specimens, the same thing is denoted by the term "ours".

The characteristics of the habit (including the underground parts and aerial appendages), stem, leaves, inflorescence, peduncle, involucre, receptacle, paleae, ray and disk flowers, fruits, and pappus are separated from each other with a period (punctuation). The different features that are described in one sentence are separated either with a comma or semicolon. The measurements of the leaves include those of the petioles (unless otherwise noted); the corolla limbs or ligules, including those of the extended connectives; and the styles, including those of the stylar arms. The description of the family features is generally not repeated in the description of the genus and those of the genera are not repeated in the description of the species. In the description of each genus and species, the description of the sterile flowers and functionally staminate flowers precedes those of other flowers; similarly the description of the pistillate flowers precedes that of the bisexual flowers.

Keys to all the taxa listed are strictly dichotomous and bracketed. Each couplet is successively numbered. The heading of the second line of each couplet begins with a morphological feature contrasting to that of the heading of the first line. For contrasting, positive characters are generally used with an occasional negative character listed. These contrasting characters are easily recognized and/or persistent. The headings begin with a noun or an adjective.

The total number of species of each genus and their worldwide distribution (after Willis 1973) and also the total number of species of each genus found in the United Stated (Rice et al. 1982) are given at the end of the generic descriptions.

Abbreviations

In order to conserve space, the following abbreviations are used in the text.

Nomenclature and references

Authority abbreviations:	as given in the National List of Scientific Plant Names
Journal abbreviations:	as given in B-P-H (Botanico-Periodicum-Huntianum)
NLSPN:	National List of Scientific Plant Names
sp.:	species (singular)
spp.:	species (plural)
var.:	variety
vars.:	varieties

Description

cm:	centimeter(s)
m;	meter(s)
mm:	millimeter(s)
vmsl:	ventro-marginal stigmatic lines

Distribution

Compass directions:	n, ne, nw, s, se, sw, e, w
Fig.:	Figure
General distribution across the continents and the United States:	N, NE, NW, S, SE, SW, E, W
States:	Standard abbreviations

Geography

The distribution of a species within the United States is mentioned either by states or regions. This information was prepared by this senior author in a study of specimens deposited at the U. S. National Herbarium, Smithsonian Institute, Washington DC (US) and by referring to the distribution data provided in the National List of Scientific Plant Names (Rice et al. 1982)

Ecology and Phenology

According to Allen (1980), the state of Louisiana can be divided into five major vegetational regions: Coastal Marsh, Floodplain, Pine, Prairie, and Upland Hardwoods. The preference of the members of the Asteraceae for semiopen to open fields and disturbed areas is well known (Cronquist 1980). The nature of the soil or area if of a specific type such as blackish, clayey, granite, sandy, limestone, loamy, etc. is mentioned. The flowering period is given in months, eg., June to September.

TAXONOMY

Description of Asteraceae Dumort. The Aster Family

Annual, biennial, or perennial herbs or shrubs, occasionally vines (tree forms absent in ours); rhizome or stolon sometimes present; plant body less often laticiferous, occasionally aromatic. Leaves basal and/or cauline; basal leaves sometimes deciduous before anthesis; cauline leaves opposite or alternate, or opposite baseward and alternate upward, rarely whorled; blade entire to pinnatifid or pinnatisect, sometimes compound, less often resinous-glandular. Inflorescence a head (= capitulum), 1 to numerous, variously arranged, more commonly following centrifugal or basipetal pattern of arrangement. Receptacle (= rachis) short, surrounded by 1 to several series of partly or wholly green involucral bracts, flat, convex, or conical to columnar, rarely concave, occasionally bristly or pitted; each such pit if surrounded by a crown of scales, then the receptacle referred to as alveolate. Paleae (= receptacular bracts, chaffs) often present, uniform, or less occasionally dimorphic; each palea either flat and subtending a flower, or folded and clasping a flower on its dorsal side. Flowers (also known as florets in this

family) (1-) a few to numerous, protandrous, generally described as sessile (but often found to be attached to a filiform stalk), crowded on the receptacle, bisexual, pistillate (fertile or sterile), or functionally staminate; the sequence of flowering within the head centripetal; calyx (generally referred to as pappus in this family) reduced to awns, scales, bristles, or absent; corolla sympetalous; stamens (4-) 5, epipetelous, included or exserted; filaments generally free; anthers usually united (commonly referred to as syngenesious), introrse; connective extended; pollen grains spinulose or smooth-walled; ovary inferior, bicarpellary, unilocular, with a single basel ovule, style 2-branched and exserted in bisexual and pistillate flowers, often undivided and included or just exserted in functionally staminate flowers, the 2 stylar arms (= branches) variously shaped, bearing conspicuous or obscure ventro-marginal stigmatic lines (vmsl). Fruit a cypsela, smooth or various, flattened or angled, rarely subterete, often crowned with the pappus; the latter aiding the fruit in dispersal.

The success of this family is attributed to structural adaptations to the environment, efficient mechanism of pollination and dispersal of fruits, and the chemical nature of the plant body (probably preventing the grazing by cattle).

The majority of the authors regard the pappus to be a reduced and highly modified calyx, but Small (1917, 1918) and Koch (1930) were of the opinion that in Helianthus and its allied genera, the calyx and corolla have fused to form a single petaloid structure, and that the pappus (if present) represents trichome-like enations from the ovary.

There are four types of corolla: 1) tubular and cuneate, or funnel-shaped with a tube and a limb, (4- or) 5-toothed or -lobed (actinomorphic); 2) tubular, often filiform, without a limb, frequently minutely 2- to 5- toothed (tending to be actinomorphic); 3) bilabiate with 1- or 2-toothed inner lip and 3-toothed outer lip (zygomorphic); and 4) ligulate, with a tube toward base and a strap upward; the strap, also called ray or ligule, often 2- to 5-toothed or -lobed (zygomorphic).

All flowers with ligulate corollas are referred to as rays; the flowers with tubular or funnel-shaped corolla are referred to as disk flowers. The author include even the flowers with bilabiate corolla under the disk type. The flowers with filiform and/or tubular corolla that are without limb are not included under ray or disk types, and since such flowers are closely similar to the disk type, they are referred to

as disciforms. (The name "disciform" refers to the nature of the corolla or head.) Basing the classification on the nature of the corolla, the heads are classified into four categories:

1. Ligulate: all the flowers are of the ray type and are bisexual.
2. Discoid: all the flowers are of the disk type and are bisexual.
3. Radiate: the marginal flowers are of the ray type and are either pistillate or sterile, rarely bisexual (e.g., Stokesia); the other flowers are of the disk type and are either bisexual or functionally staminate.
4. Disciform: the peripheral flowers are pistillate, have filiform and/or tubular corolla (disciform type), and occasionally are without corolla; the central flowers are of the disk type and are either bisexual or functionally staminate.

Besides the above mentioned classification, the head inflorescence, in a broad sense, is classified into two categories: 1) Homogamous: heads with one kind of flowers such as the staminate, pistillate, or bisexual; 2) Heterogamous: heads with two kinds of flowers such as the sterile and bisexual, pistillate and bisexual, or pistillate and functionally staminate. This kind of classification may be useful to classify the heads that are devoid of corolla, e.g., in Xanthium, the pistillate heads consist of naked flowers.

The anther bases offer a few taxonomic variables; the bases may be truncate, rounded, auricled, sagittate, or caudate (= tailed). The filaments tend to be enlarged below the anthers. The connective extends beyond the anther cells; this extended condition is quite unusual for an evolutionarily advanced family. The description of the connective, provided in the genus description, refers to this extended part. The connective is usually folded slightly outward. In most of the insect-pollinated taxa the pollen grains are spinulose, whereas in wind-pollinated taxa the pollen grains are generally smooth-walled.

The stylar arms of bisexual flowers exhibit remarkable variations in different tribes. The arms may be flattened, terete, clavate, or filiform. The stigmatic regions of the arms are within, may be near to the bases of the arms, to the middle, or beyond. The stigmatic region more often is demarcated by the presence of ventro-marginal stigmatic lines (vmsl).

The stigmatic region bears stigmatic papillae which aid in the germination of the pollen grains. The non-stigmatic regions of the stylar arms (including the external surfaces) often bear hairy appendages or papillate outgrowths. The distribution of the hairs on the arms varies: 1) forming a ring immediately below the bases of the arms; 2) at the extreme tips of the arms; 3) as an external band at the bases of the deltoid tips of the arms of from the middle of the arms to their apices; and 5) on both the surfaces from almost middle of the arms to the apices. If the hairs are absent, the arms often bear non-stigmatic papillate outgrowths which are more conspicuous than those of the stigmatic papillae.

The style plays a significant role in carrying out the process of cross pollination. The style grows vertically and passes through the anther tube with its two arms held tightly against each other. In such a condition, the stigmatic regions are not in contact with the pollen. Further, the external appendages on the stylar arms not only brush the pollen out of the anther tube to the surface of the corolla mouth but also prevent any contact between the pollen and the stigmatic region. After surpassing the anther tube and the corolla, the stylar arms diverge. Thus, the style is essential for the removal of the pollen from the anther tube. For the same reason, even in functionally staminate flowers, the style is present. The stylar arms of pistillate flowers of different taxa vary in size and shape but not in the basic pattern. Further, since the pistillate styles are only the receptors of the pollen grains and are not involved in the dispersal of the pollen, generally they are without any appendages.

Figures 1-6 give some of the variations of heads, involucre, receptacles, flowers, anther bases, pollen grains, stylar arms, and fruits.

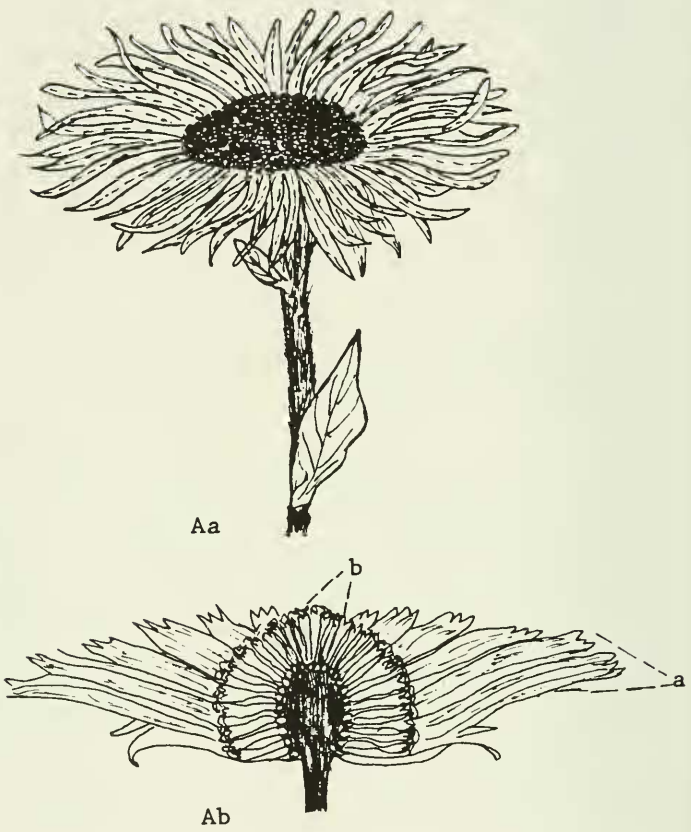


Fig. 1. Radiate Head Inflorescence in Asteraceae. (Aa) complete head; (Ab) vertical section. (a) rays; (b) disk flowers.

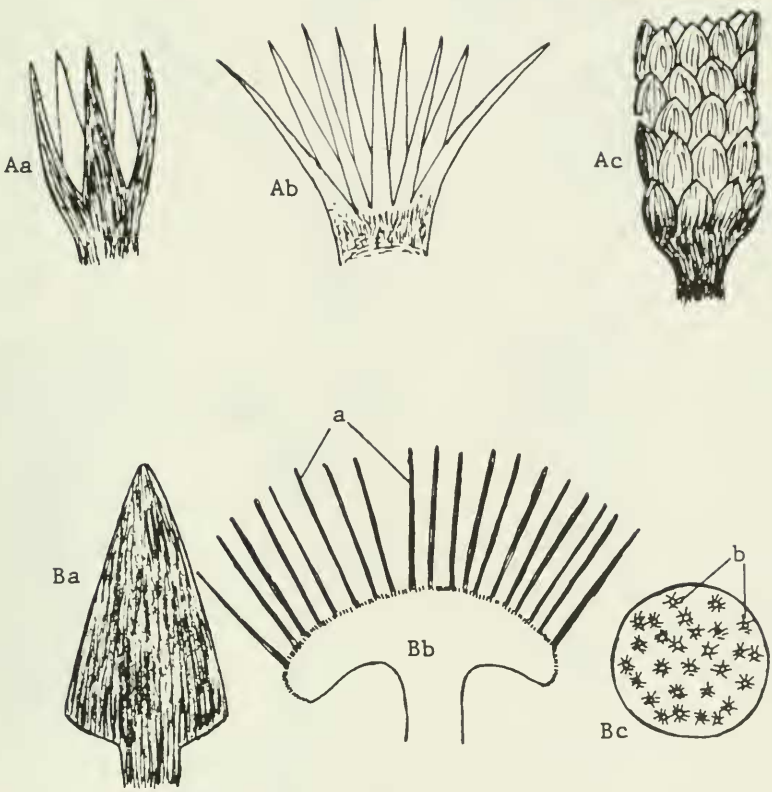


Fig. 2. Involucre and Receptacle Types in Asteraceae. (A) involucre types: (Aa) uniseriate and turbinate; (Ab) 2-seriate and campanulate (vertical section); (Ac) several-seriate and cylindrical. (B) receptacle types: (Ba) conical and naked; (Bb) convex and paleate; (Bc) circular and alveolate. (a) paleae; (b) scales.

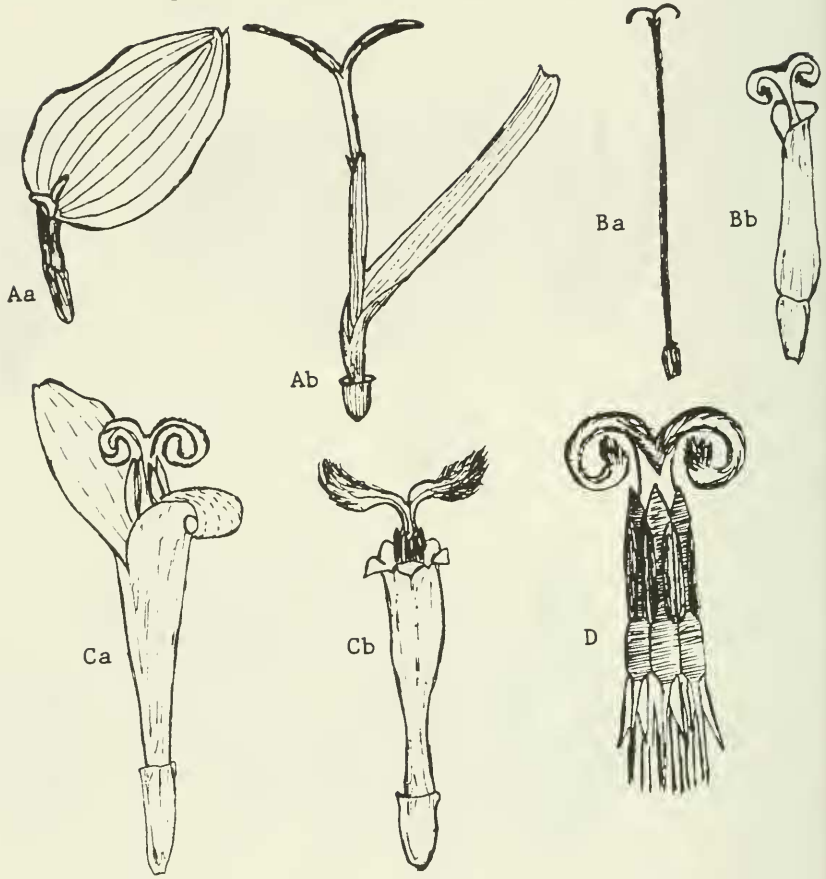


Fig. 3. Flower Types in Asteraceae and Structural Details (A) ray-flower types with ligulate corolla: (Aa) pistillate; (Ab) bisexual. (B) disciform flower types: (Ba) with filiform corolla; (Bb) with tubular corolla. (C) Disk flower types: (Ca) bisexual, with bilipped corolla; (Cb) bisexual with funnel-shaped corolla. (D) style passing through syngenesious anthers in a bisexual flower.

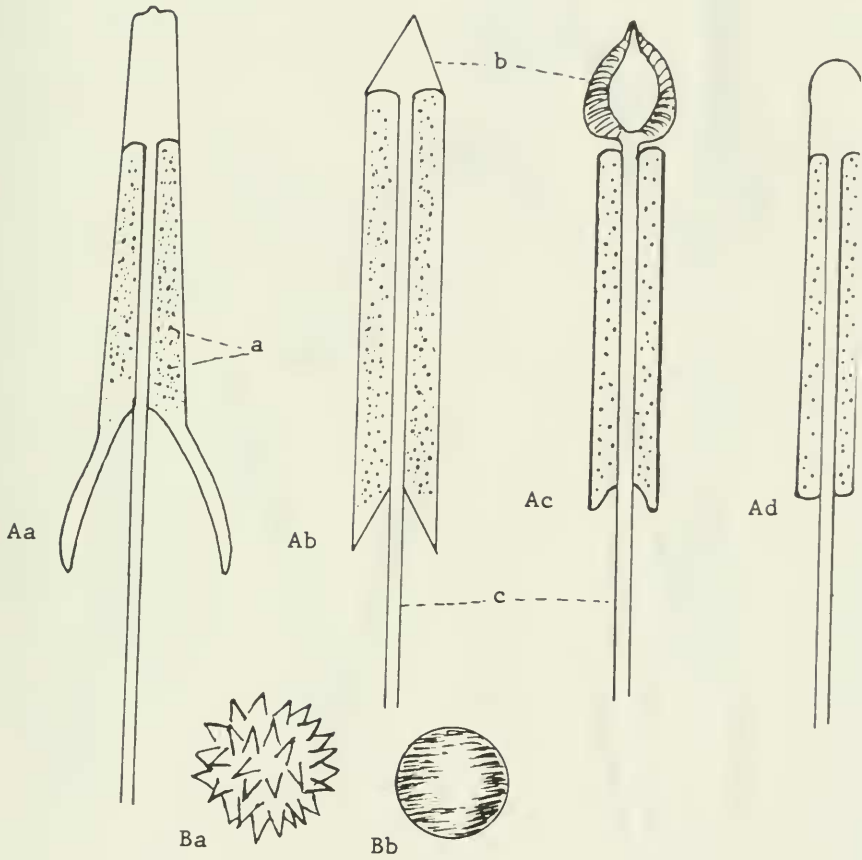


Fig. 4. Anther Base and Pollen Grain Types in Asteraceae. (A) anther base types: (Aa) tailed; (Ab) sagittate; (Ac) auricled; (Ad) rounded. (B) pollen grain types: (Ba) spinulose; (Bb) smooth-surfaced. (a) pollen grains. (b) connective; (c) filament.

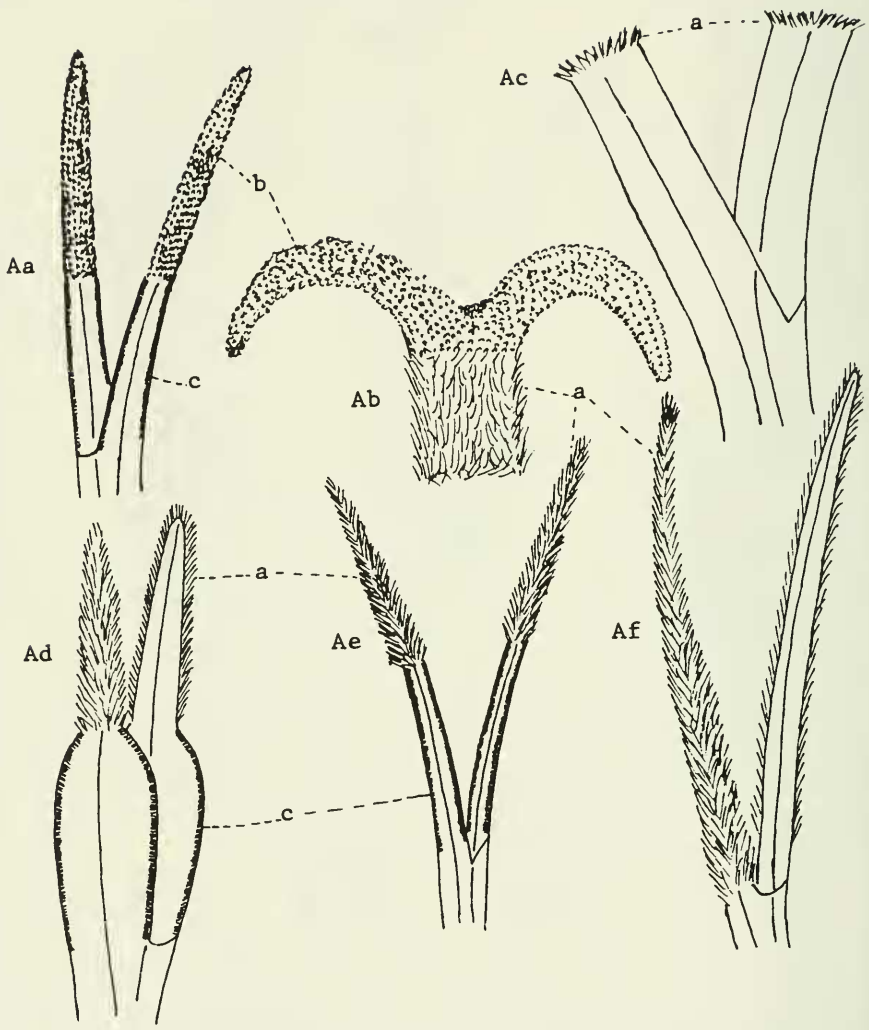


Fig. 5. Stylar Arm Types. (Aa) papillate upward; (Ab) papillate for the most part and hairy at the bases; (ac) hairy at the summit; (Ad) esternally hairy from the middle; (Ae) hairy on both sides from the middle; (Af) externally hairy from the bases to the tips. (a) hairs; (b) papillae; (c) vmsl.

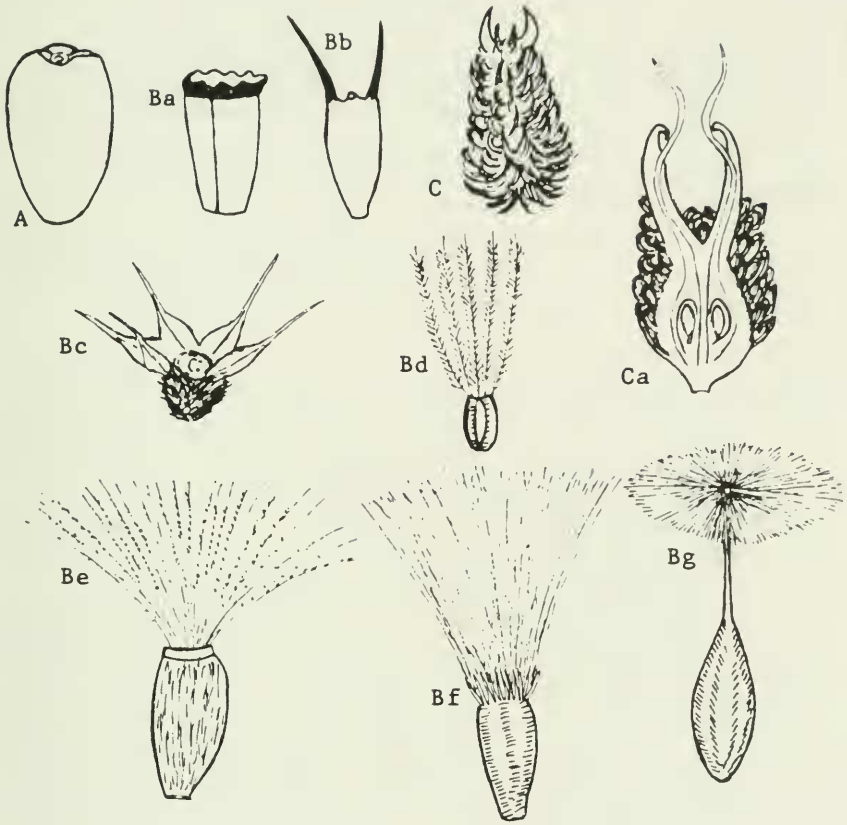


Fig. 6. Fruit (Cypsela) Types in Asteraceae. (A) without pappus. (B) crowned with various forms of pappus: (Ba) scaly crown; (Bb) awns; (Bc) awned scales; (Bd) plumose bristles; (Be) obscurely dentate bristles; (Bf) double pappus, with outer short scales, and inner longer bristles; (Bg) pappus bristles attached to the pappiferous disk at the summit of the cypsela beak. (C) cypsela completely covered with bur-like fructiferous involucre; (Ca) vertical section of the fructiferous involucre at anthesis.

Key to the Tribes Anthemideae and Senecioneae

1. Involucre 2- to 6-seriate; bracts imbricate, hyaline-scarious along the margins, occasionally petaloid; pappus absent or scaly and small; paleae present or absent ..... Anthemideae
1. Involucre generally 1-seriate; bracts subequal, herbaceous-chartaceous along the margins, not petaloid; pappus hairy; paleae absent . ..... Senecioneae

Artificial Key to the Genera of Anthemideae and Senecioneae

Anthemideae

1. Involucral bracts, all or a few white, yellow, or pinkish above the middle and appearing petaloid ... . 1. Hymenopappus
1. Involucral bracts not as above 2
2. Heads radiate; rays conspicuous or not 3
2. Heads discoid or disciform 5
3. Paleae absent..... 5. Chrysanthemum
3. Paleae present, uniformly distributed on the receptacle or restricted to the center 4
4. Rays 5 or few ..... 3. Achillea
4. Rays 10(+) ..... 2. Anthemis
5. Herbs under 25 cm high, often stoloniferous; head solitary, apparently basal or axillary; paleae and pistillate corolla absent ..... 9. Soliva
5. Herbs or subshrubs, usually reaching 0.5 to 2 m high; heads several to numerous, corymbiform, racemiform, or paniculiform, rarely solitary on long peduncles; paleae rarely present; pistillate corolla present, or flowers bisexual 6
6. Heads solitary on long peduncles; paleae present ..... 4. Santolina
6. Heads otherwise; paleae absent 7
7. Heads discoid; plant body to 0.5 m high ... . 7. Matricaria
7. Heads disciform; plant body to 2 m high 8
8. Involucre under 4 mm wide; central flowers as many as 25 ..... 8. Artemisia
8. Involucre to 1 cm wide; central flowers 100(+) ..... 6. Tanacetum

Senecioneae

1. Heads disciform ..... 12. Erechtites
1. Heads radiate or discoid 2
   2. Heads discoid; corolla white to dull pink ... . 11. Cacalia
   2. Heads radiate, if discoid, then the corolla yellow ..... 10. Senecio

Descriptions of the Genera and Species and Key to the Species of Tribe Anthemideae

1. Hymenoppappus L'Her. Woolly White

Taprooted biennials (ours). Stem branched in the inflorescence. Leaves basal and alternate; basal leaves forming a rosette, entire to pinnatified, often revolute along the margins, minutely punctate (usually visible on the upper surface), sheathing at bases; cauline leaves more or less distantly placed, smaller. Heads discoid (ours), medium-sized, terminating the branches and/or branchlets, forming a corymbiform or paniculiform inflorescence; central heads often become over-topped; terminal heads frequently grow congested. Involucre campanulate, 2- or 3-seriate; bracts petaloid, partly or wholly white, or yellow- or pink-tinged. Receptacle convex. Palaea absent. Flowers bisexual; corolla white or anthocyanic, funnel-shaped, with five reflexed lobes; anthers nearly equalling the filaments; filaments not enlarged below the anthers; connective subacute; pollen grains spinulose; stylar arms flat, deltoid at the apices, externally hairy upward or only at the apices, bearing themselves. Cypsela dark or brown obovate or obconical, 3- to 5-sided, many-nerved, bearing dense ascending hairs. Pappus of 12 to 25 small hyaline scales, crowning the fruit.

A genus consisting of 10 spp. distributed over USA and Mexico; nine spp. reported from USA; Turner (1956) performed cytotaxonomic study on this taxon.

1. Corolla white; basal leaves once or twice pinnatified; stylar arms 2 to 2.7 mm long; pappus scales under 1 mm high ..... 1. H. scabiosaeus
1. Corolla anthocyanic or white; basal leaves subentire to once pinnatified; stylar arms usually under 1.5 mm long; pappus scales 0.8 to 1.5 mm high ... . 2. H. artemisiaefolius

1. Hymenopappus scabiosaeus L'Her., Hymenopappus s. l. n. d. (1788)

Taproot as long as 20 cm. Stem floccose, becoming glabrate with age, to 1 m high; branches sparsely resinous-glandular, floccose for the most part, bearing jointed trichomes upward. Leaves glabrate above, densely white-tomentose beneath; basal leaves once or twice pinnatified, to 15 cm long (including 1 to 5 cm long petioles), primary segments often divided, to 5 x 3 cm; cauline leaves entire to pinnatifid, becoming sessile upward. Heads many to numerous. Peduncle slender, 0.5 to 4 cm high. Involucral bracts as many as 8, subequal or unequal, elliptic, ovoid, or oblong, obtuse, to 13 x 7 mm. Disk: 1 cm wide; flowers 15 to 20; corolla white, to 7 mm long, limb 4.2 x 2.2 mm, lobes 2.2 x 1 mm; style to 8 mm long, arms externally hairy upward, about 2.4 mm long, vms1 0.9 mm long. Cypsela thickened upward, cuneate below the middle, densely pilose, scarcely glandular, to 4 mm high, about 1.4 mm wide on each face. Pappus scales obovate, obtuse, slightly concave inward, to 0.9 x 0.3 mm.

E USA, MO, KS, AR, OK, TX, and AZ; scattered in dry pine woods in w LA; May to July.

2. Hymenopappus artemisiaefolius DC., Prodr. 5.658 (1836).

Similar to H. scabiosaeus in many aspects. Basal leaves subentire to once pinnatifid; undivided leaves elliptic, to 11 x 5 cm; pinnatified leaves with blade as large as 22 x 9 cm, terminal segments sometimes the largest (to 6 x 4 cm), petiole to 10 cm long. Involucral bracts to 10 x 5 mm; corolla anthocyanic, occasionally white, to 6 mm long, limb 3.5 x 1.4 mm, lobes 1.5 x 0.8 mm; style 7 mm long, arms hairy at the bases of the deltoid apices, to 1.4 mm long. Cypsela pilose on the angles and sometimes also on the surfaces, to 3.5 mm high. Pappus scales to 1.5 x 3 mm.

LA to TX; locally abundant in dry pine woods in w LA; April to June (-October).

Note: Some specimens intergrade between H. artemisiaefolius and H. scabiosaeus. They bear mixed characters such as twice pinnatifid basal leaves associated with anthocyanic corolla. In several specimens, the color of the corollas intergrades between creamy-white and pink. One specimen (R. D. Thomas 71507 and N. Carroll 1515) bears both white-flowered heads and pink-flowered heads. Cronquist (1980) also has reported about such an intergradation; he also has recommended reducing H. artemisiaefolius to a variety under H. scabiosaeus.

2. Anthemis L.

Annual, aromatic, taprooted herbs (ours). Plant body flocculent, becoming glabrate with age, branched; resinous glands scarcely present on the leaves and fruits. Primary axis sometimes short, Leaves alternate, once or twice pinnatisect, bearing lateral appendages at the bases, Heads radiate (ours), terminating the branches. Pedunculiform branches naked below the heads. involucre campanulate or hemispherical, usually 2- 3-seriate; bracts scarious-margined, subequal. Receptacle shortly conical. Paleae present, found all over the receptacle or restricted to the center, hyaline. Rays: pistillate or sterile; corolla usually white, sometimes yellow; stylar arms (if present) smooth. Disk: flowers numerous, bisexual; corolla yellow, funnel-shaped or cylindrical and constricted below the middle, bulbous at the base, 5-toothed; anthers longer than the filaments, auricled; connective subacute; pollen grains spinulose; stylar arms truncate, penicillate, bearing vmsl from the bases to the apices. Cypsela glabrous, several-ribbed, smooth or muricate, often 4- or 5-angled. Pappus of a short scaly crown, absent.

A genus consisting of about 200 spp. distributed over Europe, Mediterranean to Persia; four spp. reported from USA.

1. Rays fertile; paleae distributed all over the receptacle ..... 1. A. arvensis
1. Rays sterile; paleae absent in the margin of the receptacle ..... 2. A. cotula

1. Anthemis arvensis L., So. Pl. 894 (1753). field chamomile

Plant body to 70 cm high. Leaves 2(-5) x 2(-3) cm; ultimate leaf segments filiform or linear. Heads many, medium-sized. Peduncle 2 to 10 cm high. Involucre to 7 x 10(-16) mm; bracts oblong, abruptly acuminate to caudate, ciliated, 1.8 mm wide. Receptacle 8 mm high (at fruiting). Paleae distributed all over the receptacle, slightly folded, acuminate, 3.5 mm high, 0.5 mm wide on each face. Rays: about 16, pistillate; corolla 14(-20) mm long, ligule 12(-18) x 4 mm; style 2.7 mm long, arms 0.4 mm long. Disk flowers; corolla 3.3 mm long, limb 1.8 x 1 mm, teeth 0.6 x 0.5 mm; style 2.7 mm long, arms 0.5 mm long. Cypsela brown, smooth, 1.3 x 0.7 mm. Pappus usually absent.

In most parts of USA (excluding TX to AR, NV to CO); one specimen is at US, collected by L. A. B. Langlois (no. 87) from w LA (without the name of the location) in 1885; April to July.

Note: According to Willis (1973) the fruit has papillae on its upper surface which become sticky when wet.

2. Anthemis cotula L., Sp. Pl. 894 (1753)
may weed, dog fennel

Similar to A. arvensis in many aspects; plant body to 60 cm high. Leaves to 6 x 2.5 cm. Heads many, medium-sized. Peduncle 5 to 8 cm high. Involucre to 0.5 x 1.5 cm; bracts oblong to lanceolate, acute, tending to be glabrate. Receptacle to 1 cm high (at fruiting). Paleae restricted to the center of the receptacle and peripherally absent, linear, 2.3 mm high. Rays: 10 to 14, sterile; corolla 12 to 15 mm long, ligule to 12 x 3 mm. Disk flowers: corolla 2.8 mm long, limb 1.5 x 1.2 mm, teeth 0.6 x 0.4 mm; style 3 mm long, arms 0.6 mm long. Cypsela brown, often slightly curved, generally tubercled along the ribs, to 1.3 x 0.7 mm. Pappus absent.

Found all over USA; locally abundant in low fields throughout the state; April to June.

3. Achillea L. Yarrow

Perennial herbs. Stem 1 to a few-clustered, branched in the inflorescence. Leaves basal and alternate; basal and lower cauline leaves petiolate, sheathing; median and upper cauline leaves almost sessile; blade twice or thrice pinnatisect. Heads radiate, small-sized, peduncled, arranged in flat- or convex-topped paniculate corymbiform cymes. Involucre turbinate, a few-seriate; bracts 1-ribbed or not, scarious- margined. Receptacle conical in fruit. Paleae present, outer ones similar to the involucral bracts, inner paleae concave to keeled, sheathing the disk flowers on their dorsal sides. Rays: 3 to 5, pistillate; corolla white, pink, or purple, ligule 3-toothed. Disk flowers: many, bisexual; corolla funnel-shaped, teeth 5, subacute, ascending or spreading; anthers slightly longer than the filaments, tailed; connective obtuse; pollen grains spinulose; stylar arms truncate, penicillate (the pistillate stylar arms lacking these appendages), bearing the vmsl for almost their entire lengths. Cypsela compressed, cuneate, callous-margined, glabrous. Pappus absent.

A genus consisting of about 200 spp. distributed in N Temperate regions; five spp. reported from USA.

1. Achillea millefolium L., So. Pl. 899 (1753). millefoil yarrow

Rhizomatous, fibrous-rooted, aromatic herbs. Plant body thinly floccose to woolly; resinous glands often present on the leaves and inflorescence. Stem to 1.2 m high. Basal and lower leaves often deciduous; median leaves to 15 x 1.5(-4) cm, ultimate segments 0.2 mm wide. Heads numerous. Involucre about 4 mm high; outermost involucral bracts elliptic to ovate, obtuse, to 2 x 1.2 mm; inner bracts and outer paleae elliptic, concave, to 3 x 1.2 mm; inner paleae 3.5 x 1.5 mm. Rays: corolla tube 1.7 mm long, ligule 2 x 2.2 mm. Disk: 4 mm wide; flowers 20 to 40(+); corolla 2.8 mm long, limb 1.2 x 1 mm, teeth 0.3 x 0.3 mm; style 2.1 mm long, arms 0.6 mm long. Cypsela about 1.4 x 0.5 mm.

Occuring throughout USA; scattered and locally abundant along roadsides in the state; May to July.

Note: In the vegetative state, this species resembles ferns. This taxon may be polymorphic: the number of disk flowers varies from 10 to 20 (as per Correll and Johnston 1970, and Cronquist 1980).

4. Santolina L.

Aromatic subshrubs (ours). Leaves alternate, pinnatifid, pectinate, or finely dissected, absent on the pedunculiform branches. Heads discoid, medium-sized, terminating the branches. Involucre campanulate, about 5-seriate; bracts scarious or scaly, yellowish. Receptacle convex, alveolate, (appearing as rudimentary honeycomb). Paleae present, slightly folded, each one sheathing an ovary or a fruit. Flowers as many as 100 (ours); corolla yellow, somewhat angled baseward, 5-toothed; anthers nearly equal to the filaments, sagittate; connective obtuse; pollen grains spinulose; stylar arms flat, truncate, penicillate, bearing the vmsl for the entire lengths. Cypsela angled, glabrous. Pappus absent.

A genus of 10 spp. distributed over W Mediterranean; one sp. reported from USA.

1. Santolina chamaecyparissus L., Sp. Pl. 842 (1753). lavender-cotton

Plant body profusely branched, gray- to silvery-tomentose on the branches and leaves, to 60 cm high; resinous glands concealed by the tomentum. Leaves numerous, oblong in outline, petioled, 2(-2.5) x 0.3 cm; leaf segments many, congested, about 1.5 x 0.5 mm. Heads

about 12. Peduncle 4 to 5 cm high. Involucre thinly flocculent, 5 x 10 mm; bracts 1-ribbed, concave inward; outermost bracts lanceolate, subacute, 3.2 x 1 mm; inner bracts elliptic, about 3.7 x 1.7 mm. Paleae stalked, obtuse, pubescent at the apices, often with a pink median rib, 4.2 mm high, 0.8 mm wide on each face. Corolla 5.4 mm long, teeth reflexed, 0.8 x 0.7 mm; style 5.6 mm long, arms 1.4 mm long. Cypsela 3- to 5-angled, cuneate, brown on the faces, scarious along the angles, 2.5 mm high.

Often cultivate; escaped, and naturalized in some parts of USA; long-persisting in cemeteries and around old buildings; March to June.

5. Chrysanthemum L.

Annual or perennial herbs. Leaves alternate, often basally disposed, simple toothed to shallowly pinnatifid. Heads usually radiate, medium- to fairly large-sized, solitary to several, terminating the stem and branches. Involucre about 5-seriate (ours), imbricate; bracts progressively larger inward. Receptacle almost flat and circular (ours). Paleae absent. Rays: as many as 30 (ours), pistillate; corolla white (ours), ligule minutely 2- or 3-toothed; stylar arms bearing the vms1 for their entire lengths, papillate at apices. Disk flowers: numerous, bisexual; corolla yellow, funnel-shaped, 5-toothed; anthers minutely auricled or rounded at the bases, slightly longer than the filaments; connective obtuse to subacute; pollen grains spinulose; stylar arms truncate, penicillate. Cypsela glabrous, a few- to several-ribbed, cylindrical or angled, pistillate ones sometimes scarcely 2- or 3-winged or -angled. Pappus of an inconspicuous scaly crown, or absent.

A genus consisting of nearly 200 spp. (in a broad sense) and distributed over Europe, Asia, Africa, and America, or consisting of five spp. (in a strict sense) and distributed over Eurasia and Mediterranean; three spp. found in USA (in a strict sense).

1. Chrysanthemum leucanthemum L., Sp. Pl. 888 (1753).

ox-eye daisy, white weed

Leucanthemum vulgare Lam., Fl. Fr. 2:137 (1778).

Perennial, rhizomatous, fibrous-rooted, glabrous herbs. Stem 1 to a few together, rooting at the bases and forming clumps, branched or not, to 70 cm high. Leaves tending to be basal or absent at least below the

heads; basal leaves spathulate, elliptic, or suborbicular and narrowed into winged petioles, obtuse to subacute, crenate, bluntly toothed or shortly lobed, 3(-10) x 1(-2.5) cm including 1 to 7 cm long petioles); lower cauline leaves spathulate or oblanceolate; other cauline leaves becoming oblong and sessile upward. Head solitary or a few. Peduncle often naked, to 20 cm high. Involucre hemispherical, 6 x 10(-15) mm; bracts scarious and purple-tinged along the margins; outermost bracts ovate, obtuse to acute, 3.7 x 2.2 mm; innermost bracts lanceolate, obtuse, 6.5 x 2.3 mm. Rays: corolla tube flattened and appearing winged, 2 mm long, ligule 10(-20) x 4 mm; style 2.8 mm long, arms 0.7 mm long. Disk flowers: corolla somewhat constricted in the middle, 3.6 mm long, limb 2.8 x 0.9 mm, teeth 0.7 x 0.5 mm; style 4 mm long, arms 0.7 mm long. Cypsela dark brown, about 10-ribbed, disk ones somewhat obovoid, to 2 x 0.7 mm.

Introduced, and established as a weed in temperate parts of USA; uncommon along roads on sandy soils in the n and se parts of the state; April to June.

6. Tanacetum L. Tansy

Perennial, often stoloniferous herbs (ours). Stem solitary, or a few separately arising from the creeping rhizome, branched at apex. Leaves alternate, once to thrice pinnatifid, punctate, sheathing at the bases; rachis narrowly winged; lower leaves deciduous. Heads disciform (ours), but generally appearing discoid, racemiform or arranged in flat- or convex-topped corymbiform cymes, peduncled. Involucre saucer-shaped, 4- or 5-seriate; bracts obtuse or irregular at apices, scarious-margined upward, 1-nerved, becoming narrower inward. Receptacle hemispherical (ours). Paleae absent. Marginal flowers: 5(+), pistillate; corolla simulating that of the disk, somewhat compressed, usually 3-toothed, teeth flat or hooded; stylar arms just exserted, bearing the vmsl from the bases to the apices, inconspicuously papillate at the summit. Central flowers: about 200, bisexual; corolla yellow, cylindrical, scarcely differentiated into limb and tube, teeth usually 5, subacute; anthers shorter than the filaments, minutely auricled at bases; filaments slightly enlarged below the anthers; connective obtuse; pollen grains spinulose; stylar arms simulating those of the pistillate ones, truncate, penicillate. Cypsela glabrous, 3-angled (in pistillate flowers) or 5-angled (in bisexual flowers), crowned with minutely dentate inconspicuous cupular scaly pappus.

A genus consisting of 50 to 60 spp. found in N. Temperate regions; six spp. reported from USA.

1. Tanacetum vulgare L., Sp. Pl. 844 (1753)

Aromatic, coarse, glabrate herbs. Stem to 2 m high. Leaves commonly twice or thrice pinnatifid, sessile or petioled, about 15 x 8 cm; pinnae to 4 x 1.8 cm; ultimate segments serrate. Heads many to numerous. Peduncle 1 to 3 cm high. Involucre to 1 cm wide; outer bracts narrowly elliptic to oblong, 3.4 x 1.4 mm; inner bracts spathulate, to 2.7 x 0.6 mm. Corolla 2.2 x 0.7 mm, teeth erect or reflexed, 0.3 x 0.3 mm; style to 2.2 mm long, arms 0.5 mm long. Cypsela dull brown, about 1 mm long. Pappus 0.2 mm long.

Scattered in most parts of USA; escaped from cultivation and becoming naturalized; (July-) August to September (-October).

7. Matricaria L.

Herbs. Leaves alternate, pinnatifid or dissected. Heads discoid (ours), small- to medium-sized, terminating branches, sometimes appearing corymbiform. Involucre 2- or 3- seriate; bracts lanceolate, obtuse, 1-nerved, green, scarious- or hyaline-margined. Receptacle conical in fruit. Paleae absent. Flowers numerous, small-sized; corolla yellow, funnel-shaped, 4- or 5-toothed; anthers shorter than the filaments, auricled; connectice conical, acute; pollen grains spinulose; style branches short, flat, scarcely penicillate at the apices. Cypsela slightly curved, cuneate, a few-nerved on the ventral side. Pappus none (ours),

A genus consisting of 40 spp. from Europe, Mediterranean, and W Asia, 10 spp. from S Africa, and six spp. chiefly from NW America.

1. Matricaria matricarioides (Less.) T. Porter, Mem. Torrey Bot. Club 5:341 (1894).
pineapple weed
Artemisia matricariodes Less., Linnaea 6:210 (1831).
Matricaria discoidea DC., Prodr. 6:50 (1837).

Annual herbs, freely branched from the bases, taprooted, pineapple-scented, to 40 cm high. Stems and branches glabrescent. Leaves pinnatifid, often sheathing at the bases; lobes entire and linear, or repeatedly pinnatified, glabrous, 5 x 1.5 cm; ultimate segments 0.5 mm wide. Heads many. Peduncles to 12 mm high.

Involucre broadly campanulate, to 0.4 x 1 cm; outer bracts 1 mm wide. Receptacle about 4 x 1.7 mm. Corolla 1.8(-2.1) mm long, limb 0.6 mm long, teeth 4(-5), 0.2 mm long; style to 1.5 mm long, arms 0.2 mm long. Cypsela often bearing 1 or 2 reddish brown lines, about 1.2 x 0.5 mm.

Common in W USA, less common in E USA; rare along roadsides in East Carroll, Franklin, and Morehouse parishes; March to June.

Note: Gandhi and Thomas (1984d) published a note on the nature of the disk-corolla of this taxon.

8. Artemisia L. Worm Wort, Worm Wood, Sage Brush

Annual or perennial, generally aromatic herbs or subshrubs. Stem striated, usually branched in the inflorescence. Leaves alternate, frequently pinnatifid, more often gray- or white-tomentose beneath; stipule-like foliar appendages often present at the leaf bases. Heads disciform (ours), small- or medium-sized, subsessile to peduncled, numerous, generally arranged in paniculiform inflorescence. Involucre 3- or 4-seriate; median and inner bracts scarious-margined or scarious for the most part. Receptacle convex or hemispherical, occasionally bearing glandular hairs (otherwise paleae absent). Central flowers: yellow, funnel-shaped, bearing short glandular hairs, 5-toothed; anthers longer than the filaments, shortly tailed or auricled; connective flat, acute; pollen smooth-walled; stylar arms truncate, penicillate, vmsl as long as the arms. Marginal flowers: pistillate; corolla tubular, 2-toothed; style exserted, arms not penicillate, otherwise similar to those of the central flowers. Cypsela glabrous, faintly ribbed. Pappus absent.

A taxon consisting of 400 spp. distributed in N Temperates, S Africa, S America, and introduced elsewhere; over 60 spp. reported from USA; this taxon is wind-pollinated.

1. Leaves twice or thrice pinnatifid, pubescent only on the nerves beneath; annuals ..... 3. A. annua
1. Leaves entire to pinnatifid, densely gray- or white-tomemtose on one or both the surfaces; perennials 2
   2. Leaves entire, if lobed, then the segments not secondarily divided; stipule-like appendages usually absent ..... 2. A. ludoviciana
   2. Leaves often once or twice pinnatifid, occasionally palmatifid; stipule-like appendages usually present ... 1. A. vulgaris

1. Artemisia vulgaris L., Sp. Pl. 848 (1753)
mugwort

Fibrous-rooted, often stoloniferous, perennial herbs, with short, thickened rizome, to 1.5 m high. Stem branched upward, puberulent below the inflorescence, glabrate baseward. Stipule-like appendages usually present at the bases of the leaves; lower leaves deciduous; median leaves ovate or elliptic in outline, more often pinnatifid, less often palmately pinnatified below the inflorescence, abruptly narrowed into petioles or subsessile, generally glabrescent above, punctate-glandular and densely white-tomentose beneath, to 6(-10) x 4(-6) cm, lower primary segments often entire, other segments secondarily divided; upper leaves sessile, entire. Heads small-sized, numerous, arranged in terminal and subterminal paniculiform inflorescence; each head subtended by a short foliar bract. Peduncle 0.5 to 2 mm high. Involucre almost cylindrical, 2.7 x 1.8 mm; bracts scarious-margined, often ciliolate; outermost bracts ovate, 1.7 x 1 mm; innermost bracts oblanceolate, 3 x 1.3 mm. Central flowers: commonly three of them reaching maturity; corolla white, 2.2 mm long, limb 1.2 x 0.8 mm, teeth 0.4 x 0.4 mm, with reflexed apices; style 2 mm long, arms 0.6 mm long. Pistillate flowers: about 6; corolla 1.2 mm long; style 2.3 mm long, arms 1.2 mm long.

Occurring in E and W USA; widely scattered in LA; September to October.

2. Artemisia ludoviciana Nutt., Gen. Am. 2:143 (1818).

dusty miller

Fibrous-rooted, stoloniferous perennials, with creeping rhizomes, to 1.5 m high; resinous glands present on the leaves beneath and also on the stem apices, concealed. Stem 1 to a few together, densely arachnoid-villous or persistently white-woolly. Leaves elliptic, oblong, or oblanceolate, entire to lobed, densely gray- or white-tomentose on both the sides or just beneath, 5(-7) x 2(-3) cm. Heads small-sized, numerous, arranged in a few-headed short glomerules or monochasiums, these together forming a narrow paniculiform inflorescence (to 32 x 2.5 cm).

Involucre loosely wooly, campanulate or turbinate, about 4 x 3.5 mm; outermost bracts ovate, abruptly acuminate, 2.3 x 1.8 mm. Receptacle convex. Central flowers: as many as 20; corolla white, 2(-2.5) mm long, limb 1.6 x 0.6 mm, teeth 0.5 x 0.35 mm; style 2.3 mm

long, arms 0.7 mm long. Pistillate flowers; 8 or more; corolla 1.4 mm long; style 2.5(-3.4) mm long, arms 1.2 (-1.6) mm long.

Occuring all over USA; widely scattered and escaped from cultivation; August to October.

3. Artemisia annua L., Sp. Pl. 847 (1753).
sweet worm wood

Annuals, taprooted, sweet-scented, 0.5 to 2.5 m high. Stem glabrescent, profusely branched, occasionally bushlike; branchlets slender, often 4-angled. Stipule-like appendages present; leaves twice or thrice pinnatifid, punctate-glandular, often pubescent beneath, 5(-10) x 2(-5) cm; ultimate segments dissected or lobed, 5(-7) x 2.5 mm. Inflorescence paniculiform, about 35 x 10 cm; branches racemiform, to 10 x 2(-3) cm. Heads in hundreds, small-sized, subtended by foliar bracts. Peduncle 0.5 to 1.2 mm long. Involucre hemispherical, 1.5(-2.3) x 1.8(-3.5) mm; outermost bracts about 2 or 3, herbaceous, 1(-1.5) x 0.25(-0.5) mm; median ones the largest, 4 to 6, elliptic or suborbicular, with a median green stripe, hyaline elsewhere, 1.2(-2) x 1(-1.5) mm innermost ones almost similar to the median ones but smaller or subequal. Receptacle convex, bearing short glandular hairs. Central flowers: as many as 20; corolla white, funnel-shaped, 1 mm long, limb 0.7 x 0.5 mm, teeth 0.3 x 0.3 mm; style 1.2 mm long, arms 0.3 mm long. Pistillate flowers: 6 to 10; corolla to 0.8 mm long; style 0.6 mm long, arms 0.3 mm long.

E USA, MO to UT, AZ and AR: uncommon in LA; May to November.

9. Soliva Ruiz & Pavon Stickers

Annual, often stoloniferous or closely growing and mat forming, sometimes decumbent, taprooted or fibrous-rooted, small herbs. Stem, if present, 1 to several, slender frequently appearing dichotomously branched. Leaves alternate or basal, with sheathing petioles, pinnately dissected; ultimate segments small, narrowly elliptic, acute, 2(-4) x 0.7 mm. Heads disciform, small-sized, subtended by a few leaves, solitary, basal in acaulescent species, and axillary in caulescent species. Involucre hemispherical; bracts 2- to 4-seriate, subacute, usually scarious, 1-nerved; outer bracts ovate to lanceolate; inner bracts oblong, narrower. Receptacle almost flat slightly convex, or shortly conical. Paleae absent. Central flowers: a few, functionally staminate;

corolla cylindrical and cuneate, or somewhat funnel-shaped, yellowish-green, 4-toothed; anthers truncate or shortly sagittate at the bases; connective obtuse; pollen grains spinulose; style just exserted, appearing capitate; rudimentary ovary present. Marginal flowers: numerous, pistillate; corolla absent; stylar arms smooth. Cypsela turgid, slightly flattened parallel to the involucre, bearing the persistent spinescent style, winged, often hairy at the summit; wings flat and smooth, if turgid and cross-ridge then not appearing as wings, often extending into two awns or spines at the apices, occasionally indentated at the bases. Pappus absent.

A genus consisting of eight spp. native to S America, and becoming naturalized elsewhere; six spp. (including those of Gymnostyles Juss.) reported from USA; Cabrera (1949) reviewed this genus.

1. Plants caulescent; wings of cypsela thin, extended into a pair of lateral short spines at the apices, indentated at the bases ..... 1. S. pterosperma
1. Plants essentially acaulescent; wings of cypsela turgid and cross-ridge, not extending into a pair of lateral spines, truncate at the bases 2
   2. Wings of cypsela cross-ridged from the bases to the apices or at least to 9/10 of their length, extended into a pair of lateral short awns at the apices; leaves usually once pinnatisect ... . 2. S. stolonifera
   2. Wings of cypsela cross-ridged only for 2/3 of their length, distally smooth, truncate at the apices and bases; leaves usually twice or thrice pinnatisect ..... 3. S. mutisii

1. Soliva pterosperma (Juss.) Less., Syn. Gen. Comp. 268 (1832).
   Gymnostyles pterosperma Juss., Ann. Mus. Natl. Hist. Nat. 4:262, t. 16 f. 3 (1804)

Decumbent or erect herbs, forming mats, often rooted at the lower nodes; plant body sordid-villous, to 15 cm high. Stem profusely and (apparently) dichotomously branched. Leaves once pinnatisect, to 4.5 x 2 cm; pinnae palmately cleft. Head solitary in the forks of branches and appearing axillary. Involucre to 6 mm wide; bracts 3-nerved, villous along the margins; outer bracts ovate, 4.5 to 2.2 mm; inner bracts oblanceolate or spathulate, 4.5 x 1.3 mm. Receptacle shortly conical. Central flowers: corolla 1.6 mm long, limb 1.1 x 0.5 mm, teeth 0.2 x 0.2 mm; anthers truncate at the bases; style 1.7 mm long. Marginal flowers: style stiff in fruit, 1.7 mm high. Cypsela hispidulous,

to 3.2 x 3 mm (including the wings); wings thin, ellipsoid, narrowing both upward and baseward, constricted and indentated at the bases, extended into two lateral spines upward (1.1 mm high).

NC to FL westward to TX, also in CA; abundant pest in lawns throughout the state; April to May.

Note: According to Cabrera (1949), the table(t.) number of Jussieu's publication is 61 and not 16. Cronquist (1980) described the growth of this taxon as sympodial.

2. Soliva stolonifera (Brot.) Loudon, Hort. Brit. 364 (1830).
Hippia stolonifera Brot., Phytog. Lusit. 72 (1800-1801); Fl. Lusit. 1:373 (1804).
Gymnostyles nasturtiifolia Juss., Ann. Mus. Natl. Hist. Nat. 4:262, t. 16, F. 2 (1804)

Similar to S. mutisii in several aspects; plants essentially acaulescent, stoloniferous. Leaves a few-clustered at the nodes, usually once pinnatisect, sparsely villous, to 3 x 1 cm. Head solitary at each node, found above the leaves. Invloucre 6 mm wide; bracts obtuse; outer bracts ovate to lanceolate, 3.5 x 1.2 mm; inner bracts oblong, 3.2 x 0.4 mm. Receptacle almost flat. Central flowers: corolla 1.8 mm long, limb 0.8 x 0.4 mm; anthers shortly sagittate; style 2 mm high. Marginal flowers; style semiflexuous, 2 mm high. Cypsela oblong to cuneate hairy at the summit, to 2 x 1.7 mm (including the wings); wings thick, cross-ridged from the bases almost to the apices on the ventral surfaces, slightly so or almost smooth on the dorsal surfaces, truncate at the bases, extended into a pair of lateral awns at the apices (0.7 mm high).

SC to FL, and westward to TX; scattered throughout the state; March to April.

Note: as per De Candolle (1836-38), Brotero described Hippia stolonifera in Fl. Lusit. (1:453), and also in Phytog. (p. 72); according to Index Kewensis, the description of this taxon was published in Fl. Lusit. (1:373); Cabrera (1949) mentioned that the publication was in Fl. Lusit. (1:72. 1801). According to Stafleu (1967), Broter's Phytographia Lusitaniae Selectior and Flora Lusitanica were published in 1800 (often cited as 1801) and 1804, respectively. (Also refer to the note under the description of S. pterosperma.)

3. Soliva mutisii H. B. K., Nov. Gen. et Sp. Pl. 4:302 (1820).

Plants essentially acaulescent, stoloniferous, sparsely to densely tawny or canescent villous; stolons 1 to 3 cm long. Leaves a few-clustered at the nodes, twice or thrice pinnatisect, to 12 x 2.2 cm (including 4 cm long petiole). Heads subtended by leaves, appearing in basal rosettes or clusters, but in reality solitary at each node. Involucre to 1 cm wide; outer bracts ovate to lanceolate, 5 x 1.5 mm; inner bracts oblong, 4.3 x 0.6 mm. Receptacle almost flat. Central flowers: corolla 2.7 mm long, limb 1.6 x 0.5 mm, teeth 0.2 x 0.3 mm; anthers shortly sagittate; styles 2.8 mm high. Marginal flowers: style flexuous, 2.2 mm high. Cysela oblong or slightly cuneate, hairy at the summit, about 2 x 1.2 mm (including the wings); wings thick, cross-ridged for 2/3 of thier lengths, distally smooth, the smooth region 0.7 mm high.

FL to TX; scattered and locally abundant; April to May, occasionally also flowering in winter.

Note: Correll and Johnston (1970) remarked that this taxon is closely related and perhaps conspecific with S. anthemifolia (Juss) R. Br. ex Less.; the described S. anthemifolia but did not include S. mutisii as a synonym or as a separate taxon. Since our specimens are villous, they are included under S. mutisii.

Descriptions of the Genera and Species and Key to the Species of Tribe Senecioneae

10. Senecio L. Groundsel, Ragwort

Annual, biennial, or perennial (short- or long-lived) herbs (ours); rhizomes and/or stolons often present. Stems frequently branched upward. Leaves alternate and basal, or mostly basal (then the inflorescence appearing subscapose), various in shape; reniform, suborbicular, elliptic, oblong, or ovate, crenate, toothed, lobed, or pinnatisect; basal leaves generally petiolate; cauline leaves usually sessile, auricled. Heads usually radiate, rarely discoid, medium-sized, arranged in umbelliform, corymbiform, or paniculiform cymes. Involucre campanulate, 1-seriate, often subtended by a few small greenish or purple-tinged bractlets; principal bracts generally 13, 21, or 34, lanceolate, or some of them slightly keeled, for the most part herbaceous, subequal, 0.7 to 1.7 mm wide. Receptacle flat or slightly concave. Paleae absent. Rays: as many as or fewer than the involucral bracts,

pistillate; corolla yellow or ochroleucous, ligule 2- or 3-toothed; stylar arms similar to those of the disk, but without any appendages at the summit. Disk flowers: 25(+), bisexual; corolla yellow, funnel-shaped, or cylindrical and cuneate, 5-toothed; anthers nearly equalling or slightly longer than the filaments. connective obtuse; pollen grains spinulose; stylar arms truncate or obtuse, penicillate, bearing the vmsl from the bases to the apices. Cypsela often a few-ribbed, glabrate or sericeous. Pappus of 40(+) white or sordid obscurely dentate capillary bristles.

A cosmopolitan genus consisting of as many as 3,000 spp.; about 110 spp. reported from USA.

Note: Senecio was reviewed by Barkley (1978) for the North American Flora. In his description on Senecio, Barkley (l.c.) pointed out that the number of involucral bracts and also the number of rays approximately fit into the fibonacci series (5-8-13-21-34).

1. Rays absent ..... 7. S. vulgaris
1. Rays present 2
   2. Ligule under 2 mm long ..... 8. S. sylvaticus
   2. Ligule 4 to 10 mm long 3
3. Basal leaves truncate to deeply cordate; cypsela usually glabrous; stolons usually present ... . 3. S. obovatus
3. Plants not with the above combined features 4
   4. Plants annual; leaves cauline 5
   4. Plants perennial; leaves mostly basal 6
5. Plants taprooted; terminal lobes of the leaves tending to be subreniform ... 6. S. imparipinnatus
5. Plants fibrous-rooted; terminal lobes of the leaves irregular, not subreniform ..... 5. S. glabellus
   6. Stolons present; cypsela usually glabrous ... . 3. S. obovatus
   6. Stolon usually absent; cypsela usually sericeous 7
7. Stem floccose-woolly toward the base.... ..... 4. S. anonymus
7. Stem floccose-woolly for the most part 8
   8. Basal leaves 1 to 2.5 cm wide; lower and median cauline leaves pinnatifid; biennials or short-lived perennials ..... 2. S. plattensis
   8. Basal leaves 1 to 4 cm wide; lower and median cauline leaves not or scarcely pinnatifid; perennials ..... 1. S. tomentosus

1. Senecio tomentosus Mischx., Fl. Bor. Am. 2:119 (1803).

Perennial, fibrous-rooted herbs, forming colonies; rhizome vertical. Stem usually solitary, densely arachnoid at base, sparsely so upward, becoming glabrescent with age, to 80 cm high. Leaves mostly basal, and a few cauline; basal leaves ovoid, oblong, elliptic, or ovate, obtuse, crenate, sometimes purplish beneath, to 18 x 4 cm (including the 10 cm long petiole); lower cauline leaves tending to be pinnatified with large terminal lobes (about 14 x 6 cm) and 2 or 3 pairs of small lateral lobes, petiole to 12 cm long, median and upper cauline leaves becoming small-sized and sessile, merely toothed or pinnatifid. Heads many, arranged in terminal and subterminal umbelliform or corymbiform cymes. Peduncle 1 to 6 cm high. Involucre 5(-7) x 10 mm; bracts usually 21. Rays: about 13; corolla 13 mm long, ligule 9 x 3 mm. Disk flowers: corolla 6 mm long, limb 3.2 x 1.5 mm, teeth 0.8 x 0.6 mm; style 5.2 mm long, arms 1.2 mm long. Cypsela sericeous, 2 x 0.5 mm. Pappus bristles 5.5 mm high.

E USA and TX; common along sandy roadsides in upland areas; February to May.

2. Senecio plattensis Nutt., Trans. Amer. Philos. Soc. n. s. 7:413 (1841).

Biennial or perennial, fibrous-rooted herbs; rhizome short. Stem solitary or a few together, usually arachnoid, 30 to 50 cm high. Leaves mostly basal, and a few cauline; basal leaves ovoid, oblong, or lanceolate, serrulate to serrate, occasionally tending to be lyrate, sometimes purplish-tinged, often arachnoid and becoming glabrous with age, to 7 x 1.5(-3) cm, petiole 4 to 8 cm long; cauline leaves distantly placed, pinnatifid, sessile, clasping. Heads many, arranged in corymbiform cymes. Peduncle 2 to 5 cm high. Involucre to 6 x 10(-15) mm; bracts usually 13. Rays: about 13; corolla 5 to 6 mm long, limb 3.5 x 1.5 mm, teeth 0.6 x 0.5(-0.7) mm; style to 6.7 mm long, arms 0.7 mm long. Cypsela sericeous, 2.5 x 0.6 mm. Pappus bristles white, 4.5 mm high.

Common in Midwestern USA, and spreading to E USA and TX; scattered along roadsides in upland areas; February to April.

3. Senecio obovatus Muhl. ex Willd., Sp. Pl. 3:1999 (1804). ovate-leaf ragwort

Perennial, fibrous-rooted, stoloniferous herbs; rhizome slender, oblique or horizontal; plant body glabrescent, or arachnoid for the most part or only in the leaf axils and in inflorescence. Stem usually solitary, to 60 cm high. Leaves mostly basal, and a few cauline; basal leaves ovate, ovoid, or oblong, obtuse, crenate, truncate or subcordate, sometimes lyrate and crenate, often purplish beneath, to 6 x 4 cm, petioles narrowly winged, to 8 cm long; cauline leaves distantly placed, tending to be confined to below the middle, usually lyrate or pinnatisect, with large terminal segments, sessile, clasping, to 12 x 3.5 cm. Heads several to many, arranged in umbelliform cymes. Peduncle bearing a few bractlets, 3 to 5 cm high. Involucre to 6 x 10 mm; bracts 13 or 21. Rays: about 13; corolla 8 to 10 mm long, ligule 6(-10) x 2(-3.5) mm. Disk flowers: corolla to 7.5 mm long, limb 2(-3) x 1.5 mm, teeth 1.2 x 0.6 mm; style to 7.8 mm long, arms 1 mm long. Cypsela usually glabrous, 2.3 x 0.4 mm. Pappus bristles to 6 mm high.

Common in Midwestern USA, and spreading to E USA and TX; scattered along stream banks in upland areas; March to May.

4. Senecio anonymus Wood, Class-book (ed. 1861) 464 (1861). golden ragwort
S. smallii Britt., Bull. Torrey Bot. Club 4:132 (1894).

Perennial, fibrous-rooted herbs; rhizome short, oblique. Stem densely arachnoid toward base, remaining so until fruiting or at least until anthesis, becoming glabrate with age, to 1 m high. Leaves basal and cauline; basal leaves oblong, oblanceolate, or narrowly elliptic, obtuse, crenulate, serrate, or toothed, sometimes tending to be pinnate with large terminal lobes and a few small lateral lobes, occasionally purple, to 14 x 2(-3) cm, petiole 4 to 18 cm long; cauline leaves slightly or not reduced, lower cauline leaves similar to basal leaves, pinnatifid or bipinnatifid, long-petioled, upper cauline leaves sessile. Heads numerous, arranged in corymbiform, umbelliform, to dichasial cymes. Peduncle 1 to 6 cm high. Involucre to 6 x 8 mm; bracts usually 21. Rays: generally 13; corolla to 6.5 mm long, ligule 3.5 x 1.5 mm. Disk flowers: corolla to 4.7 mm long, limb to 2.5 x 0.8 mm, teeth 0.5 x 0.5 mm; style to 5 mm long, arms 0.5 mm long. Cypsela sericeous, 1.5 x 0.5 mm. Pappus bristles 4 mm high.

E USA; rare along roadsides in Webster, Tangipahoa, and Washington parishes; (April-) May (-June).

5. Senecio glabellus Poir. in Lam. & Poir., Encyc. 7:102 (1806). yellow top, butterweed

Annual, fibrous-rooted herbs; plant body glabrous or arachnoid near the leaf axils and in the inflorescence, to 1 m high. Leaves basal and cauline; lower leaves deeply pinnatifid, to 20 x 7 cm (including the lacerate-based sheathing petioles), segments suborbicular, ovate, or obovate, toothed or irregularly lobed, sessile and broadly attached, or abruptly constricted and appearing petiolulate, sometimes purplish beneath; terminal segments to 3 x 3.5 cm (excluding the stalks, if present). Heads generally numerous, arranged in corymbiform or umbelliform cymes; older heads usually become over-topped. Peduncles 1 to 4 cm high. Involucre to 5 x 8 mm; bracts usually 13 or 21. Rays: usually 13; corolla to 8 mm long, ligule 4.5 x 1.7 mm. Disk flowers; corolla 6.5 mm long, limb 2.5 x 1 mm, teeth 0.8 x 0.4 mm; style to 5 mm long, arms 0.7 mm long. Cypsela sericeous along the ribs, rarely glabrous, yellow- or white-tinged, 1.7 x 0.5 mm. Pappus bristles to 5 mm high.

E USA, westward to WY and TX; abundant, especially on wet clay soil through out the state; February to May.

6. Senecio imparipinnatus Klatt, Abh. Naturf. Ges. Halle 15:333 (1882).

Plants essentially with slender taproots, usually below 0.5 high. Terminal segments of leaves tending to be subreniform.

OK, TX, eastward to MS; sporadic and uncommon throughout the state; March to May.

Note: The above characteristic features differentiate this taxon from S. glabellus. However, the taproots and/or the subreniform leaf segments are not always strongly developed. Some poorly developed taproots are masked by the lateral roots and appear as fibrous roots. The terminal segments of leaves are often irregularly shaped. In such a situation, it is difficult to assign the specimens to either S. glabellus or S. imparipinnatus. On the taxonomy of this complex (including S. greggii Rydb.), Correll and Johnston (1970) remarked that S. imparipinnatus intergrades with S. glabellus and S. greggii, and these three spp. are poorly defined from each other. According to these authors, S. glabellus grows in sandy soil and S. imparipinnatus is common in the eastern half of TX.

Barkley (1978) attributed wet open wooded areas or swampy grass lands to S. glabellus and low sandy damp or drying sites to S. imparipinnatus. Cronquist (1980) remarked that both the taxa grow in moist places. In LA, S. glabellus usually occurs on wet clay soils.

7. Senecio sylvaticus L., Sp. Pl. 868 (1753).

Annual herbs: taproots slender, masked with lateral fibrous roots. Stem arachnoid, becoming glabrescent with age, usually unbranched, to 60 cm high. Leaves cauline, pinnatifid or lyrate, covered with loose hairs beneath, gradually becoming smaller upward, sometimes scarcely clasping, lower leaves 3(-10) x 2(-4) cm. Heads many, arranged in corymbiform cymes. Peduncle bearing a few small bractlets, 2 to 5 cm high. Involucre 5 x 8 mm; bracts often 13. Rays: 5 to 8; corolla 4 mm long, ligule 1.5 x 0.5 mm. Disk flowers: corolla cuneate, 4.2 x 0.5 mm, limb scarcely differentiated, teeth minute; style 4.3 mm long, arms 0.5 mm long. Cypsela sericeous, 2 x 0.5 mm. Pappus bristles to 4.5 mm high.

Occasional in E USA, and more or less common from WA to CA; known only from railroad tracks in Monroe (Ouachita Parish); June to September.

8. Senecio vulgaris L., Sp. Pl. 867 (1753). groundsel

Annual herbs; taproots slender, often masked with lateral fibrous roots; plant body glabrate, scarcely pubescent or woolly, 10 to 30 cm high. Stem often branched. Leaves cauline, lyrate, pinnatifid, oblong, oblanceolate, or narrowly elliptic, sessile usually clasping, to 6 x 2 cm. Heads discoid, a few to many, arranged in corymbiform, or umbelliform cymes. Peduncle bearing a few inconspicuous bractlets, 1 to 4 cm high. Involucre 6 x 10 mm; bracts 13 or 21. Disk flowers; corolla 4.1 mm long, limb 1.5 x 0.5 mm, teeth 0.5 x 0.2 mm; style 4 mm long, arms 0.4 mm long. Cypsela 2.3 x 0.4 mm, appearing glabrous but bearing capillary hairs (1 mm long). Pappus bristles 5.5 mm high.

Nearly common all across USA; along railroad tracks in Ouachita Parish, also a weed near Jackson Square in New Orleans (Orleans Parish); March to September.

11. Cacalia L. Indian Plantain

Perennial herbs, with fleshy roots. Stem solitary or a few together, branched upward. Leaves basal and alternate, entire, remotely toothed, or undulate, coriaceous, palmately 3- to 9-nerved, these nerves diverging or converging at apex; basal leaves and lower

cauline ones petiolate; median and upper cauline leaves often becoming short-petioled. Heads discoid, medium-sized, arranged in panicled corymbiform cymes. Peduncle bearing minute bractlets. Involucre cylindrical, 1-seriate; bracts about 5 (ours), subequal, imbricate, often scarious-margined and/or keeled; keels winged or not. Receptacle flat, often centrally cusped (ours). Paleae absent. Flowers bisexual, about 5 (ours); corolla white or dull pink, funnel-shaped, 5-lobed; anthers longer than the fillaments, usually auricled; connective obtuse; pollen grains spinulose; stylar arms penicillate, vmsl from the bases almost to the apices. Cypsela glabrous, a few- to several-nerved, -ribbed, or -grooved, glutinous, transversely rugulose. Pappus of 200(+) white capillary bistles.

A genus consisting of 50 spp. mostly found in E Asia; about seven spp. (including those of Arnoglossum Raf.) reported from USA. Kral and Godfrey (1958) reviewed the Florida Cacalia.

1. Leaves toothed to lobed, with diverging nerves .... 1. C. atriplicifolia
1. Leaves entire to remotely toothed, with converging nerves 2
   2. All or some of the involucral bracts with median scarious wings along the keels (conspicuous at fruiting); stem angled or grooved ... . 2. C. plantaginea
   2. Involucral bracts without median wings; stem terete or striate ..... 3. C. ovata

1. Cacalia atriplicifolia L., Sp. Pl. 835 (1753). pale Indian plantain
   Mesadenia atriplicifolia (L.) Raf., New Fl. 4:79 (1836)
   Arnoglossum atriplicifolium (L.) H. Rob., Phytologia 28:294 (1974)

Similar to C. ovata in several aspects. Stem often glaucous, terete or grooved, to 2 m high. Median leaf blades ovate, elliptic, or reniform, toothed or lobed along the margins, granular-punctate above, glaucous or pale green beneath, with diverging palmate nerves, about 12 x 12 cm, petiole to 20 cm long; upper leaves becoming reduced and short-petioled. Main peduncle to 10 cm high. Involucre to 9 x 3 mm; bracts obtuse, to 7 x 2.3 mm. Corolla 7.5 mm long, limb 3.2 x 0.8 mm, lobes 2.2 x 0.4 mm; style 8 mm long, arms 1 mm long. Cypsela dark-brown, bluntly angled, ribbed, to 4 mm high. Pappus 6 mm high.

NJ westward to MN, south to FL, LA, and OK; in LA, one specimen is at NO collected by Josiah Hale with no ticket or location, probably from Rapides Parish area during the 1830's; another specimen is at US collected by Mohr, probably collected from se LA in 1884; July to October.

2. Cacalia plantaginea (Raf.) Shinners, Field & Lab. 18:81 (1950).
tuberous-rooted Indian plantain
Arnoglossum plantagineum Raf., Fl. Lud. 65 (1817).
Cacalia tuberosa Nutt., Gen. Am. 2:138 (1818).

Similar to C. ovata in many aspects; plant body often glaucous on the stem and leaves beneath, to 1.5 m high. Stem dark purple, tending to be angled and/or grooved. Basal leaves elliptic, ovate, obovate, or rhomboid, obtuse to subacute, truncate or subacute at base, with converging nerves, blade to 22 x 8 cm, petiole to 30 cm long. Involucre to 12 x 5 mm; bracts, all or fewer with strong median wings along the keels, 1 mm wide on each face; wings conspicuous at fruiting, about 1 mm wide. Corolla 10.5 mm long, limb 5 x 1.5 mm, lobes 4 x 0.7 mm; style 10.6 mm long, arms 2.4 mm long. Cypsela elliptic or ovoid, greenish-yellow, several-ribbed or appearing grooved, to 3 x 1.5 mm. Pappus bristles 7 mm high.

E and Midwestern USA and TX; common in w LA and in pinelands of the Florida parishes; April to July.

3. Cacalia ovata Walter, Fl. Carol. 196 (1788).
ovate-leaf or lance-leaf Indian plantain
Cacalia lanceolata Nutt., Gen. Amer. 2:138 (1818)
Arnoglossum ovatum (Walter) H. Rob., Phytologia 28:294 (1974).

Plant body often glaucous on the stem and leaves beneath, to 1.5 m high. Stem terete baseward, striate upward. Basal leaves elliptic to ovate, with converging nerves, blade 14 x 10 cm, petiole to 18 cm long; lower cauline leaves elliptic to ovate, obtuse, narrowed into winged petioles, about 22 x 12 cm (including 6 cm long petiole), becoming deciduous along with the basal leaves. Main peduncle to 15 cm high. Involucre to 10.5 x 5 mm; bracts lanceolate, obtuse often scarious-margined, somewhat keeled but without median wings, to 10 x 2.3 mm. Corolla 10.7 mm long, limb 5 x 2 mm, lobes 3.2 x 0.3 mm, becoming reflexed; style 10.8 mm long, arms 1.8 mm long. Cypsela cuneate, dark, weakly

to strongly nerved, about 5 x 1.1 mm. Pappus bristles 6 mm high.

SC to Fl, westward to TX; ovate-leafed forms most common in bay-galls of se LA; lance-leafed forms most common in sw prairies; June to September.

12. Erechtites Raf.

Annual, fibrous-rooted, tall herbs. Stem branched in the inflorescence and often below it. Leaves alternate, simple, subentire to lobed, reduced to bracts in the inflorescence. Heads disciform, medium-sized, peduncled, arranged in monchasiums or corymbiform cymes. Involucre 1-seriate, usually cubtended by a few loosely arranged linear short herbaceous bractlets, these passing downward on the peduncle; bracts herbaceous. Receptacle flat, inconspicuously alveolate. Paleae absent. Marginal flowers: pistillate, numberous; corolla whitish, tubular, slender, 5-toothed; stylar arms exserted, with short apparently pappillate deltoid apices; vmsl as long as the arms. Central flowers; numerous, bisexual; corolla somewhate dilated just below the mouth, otherwise tubular and slender; anthers shorter than the filaments, slightly auricled; connective obutse; pollen grains spinulose; stylar arms almost similar to those of the pistillate ones except for the presence of a tuft of hairs at the bases of the deltoid apices. Cypsela several-nerved, scarcely sericeous. Pappus of numerous capillary deciduous inconspicuously and distantly dentate bristles.

A genus consisting of 15 spp. distributed over America, Australia, and New Zealand; three spp. reported from USA.

1. Erechtites hieracifolia (L.) Raf. ex DC., Prodr. 6:294 (1838).
Senecio hieracifolia L., Sp. Pl. 866 (1753).

Plant body glabrescent or thinly covered with jointed trichomes, to 2 m high. Leaves narrowly elliptic, ovate, lanceolate, or oblanceolate, acute, serrate or toothed, gradually becoming smaller upward; lower leaves narrowed into petioles; median and upper leaves attenuate baseward, petioled, or with broad sessile and somewhat clasping bases. Heads several to many. Peduncles 2 to 5 cm high. Involucre to 14 x 9 mm (at anthesis); bracts as many as 12, linear to oblong, acute, scarious-margined, subequal or unequal, to 1.5 mm wide. Pistillate flowers: 100(+); corolla 12 to 15 mm long, teeth 0.3 x 0.2 mm; style 13 to 16

mm long, arms 0.5 mm long. Central flowers; 50(+); corolla 13 to 15 mm long, teeth 0.6 x 0.5 mm; style to 16 mm long, arms 0.5 mm long. Cypsela pale brown, 2.2 mm high. Pappus bristles white, slightly shorter than the corolla.

1. Upper leaves with broad, sessile or subsessile, and somewhat clasping bases ..... 2. var. praealta
1. Upper leaves attenuate baseward ... . 1. var. intermedia

1. var. intermedia Fernald, Rhodora 19:27 (1917).

Features as given in the key.
E USA and TX; common in cut-over woods throughout the state; (June-) August to October.

2. var. praealta (Raf.) Fernald, Rhodora 19:27 (1917).
E. praealta Raf., Fl. Lud. 65 (1817).

Features as given in the key.
E USA; common throughout the state; (June-) August to September.
Note: the vars. intermedia and praealta are not mentioned by Cronquist (1980). In NLSPN (Rice et al. 1982) these vars. are treated as synonyms under E. hieracifolia.

SPECIES DISTRIBUTION MAPS

The location of the Louisiana parishes is illustrated in figure 7. Figures 8 to 10 give the Louisiana distribution of the 25 species covered in this state. No definite locations for Anthemis arvenis and Tanacetum vulgare are known from Louisiana.

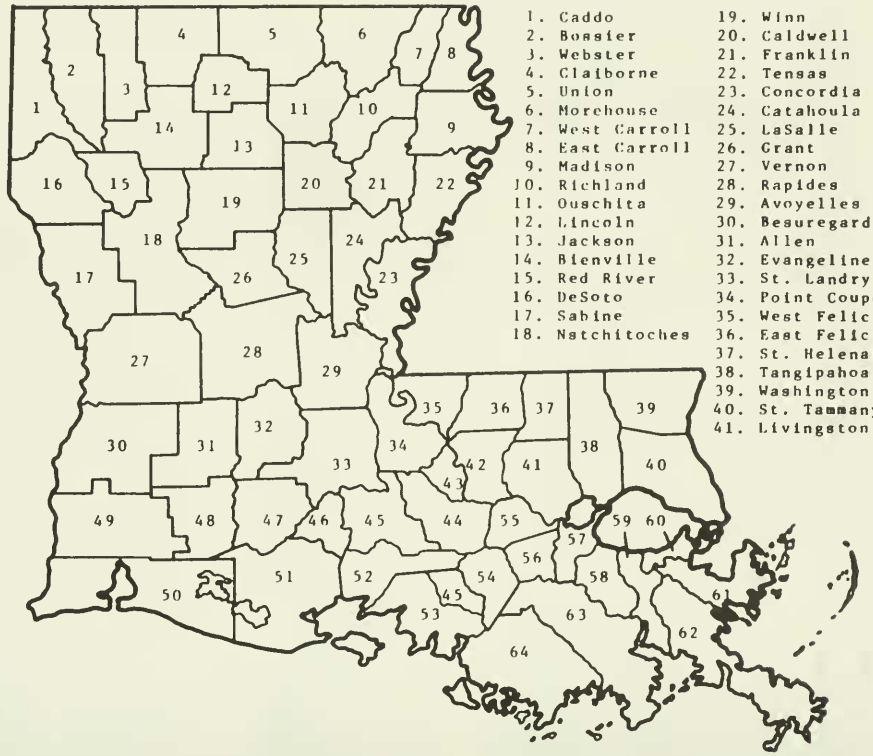
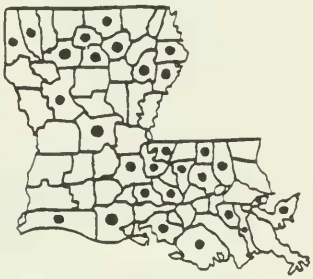


Fig. 7. Parishes in Louisiana.

Hymenopappus scabiosaeus

Hymenopappus artemisaefolius



Anthemis cotula

Achillea millefolium

Santolina chamaecyparissus

Chrysanthemum leucanthemum

Fig. 8. Distribution of Asteraceae in Louisiana, I.

Matricaria matricarioides

Artemisia vulgaris

Artemisia ludoviciana

Artemisia annua

Soliva pterosperma

Soliva stolonifera

Fig. 9. Distribution of Asteraceae in Louisiana, II.

Soliva mutisii

Senecio tomentosus

Senecio plattensis

Senecio obovatus

Senecio anonymus

Senecio glabellus

Fig. 10. Distribution of Asteraceae in Louisiana, III.

Senecio imparipinnatus

Senecio sylvaticus

Senecio vulgaris

Cacalia atriplicfolia

Cacalia plantaginea

Cacalia ovata

Fig. 11. Distribution of Asteraceae in Louisiana, IV.

Erechtites hieracifolia var. intermedia

Erechtites hieracifolia var. praelta

Fig. 12. Distribution of Asteraceae in Louisiana, V.

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